

FANS OF THE FUTURE

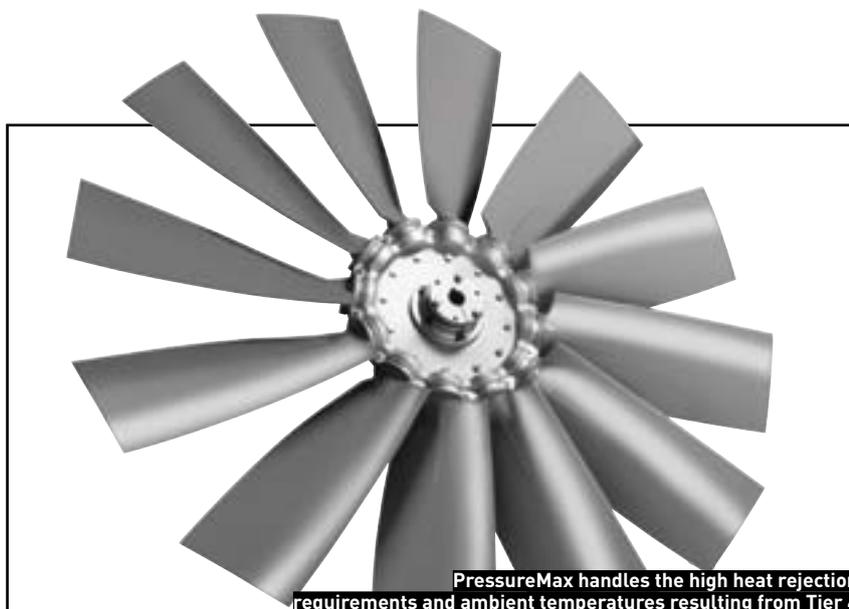
THE IMPLEMENTATION OF TIER 4i PLACED INCREASED DEMANDS ON ENGINE COOLING SYSTEMS – AND THE SPACE REQUIRED TO HOUSE THEM. IN RESPONSE, A GROUP OF ENGINEERS HAVE CREATED THE ULTIMATE FAN, ONE THAT HAS BEEN DESIGNED TO EXCEL IN THESE TOUGH CONDITIONS

Off-highway diesel engine manufacturers in Europe and North America are facing a hefty challenge to meet the Tier 4i and Stage IIIB emissions standards for non-road engines. Luckily, help is now in sight – because, using the most advanced technology and design process yet, a group of skilled Multi-Wing engineers has succeeded in designing an off-highway engine cooling fan that creates 20% more static pressure and delivers 5-7 percentage points better efficiency than a standard airfoil fan, saving both fuel and horsepower.

Named PressureMax, the new fan has been tailored especially to fit tight installation spaces, and also has a low-noise airfoil blade design with virtually zero blade deflection.

An unprecedented mission

The new emissions standards call for stringent reductions in pollutants such as PM and NOx, resulting in new and unprecedented challenges. A group of Multi-Wing’s specialised engineers were therefore asked to develop a much better cooling package. They had to surmount challenging obstacles such as higher heat rejection requirements, higher ambient temperatures and air-treatment technologies that occupy up



PressureMax handles the high heat rejection requirements and ambient temperatures resulting from Tier 4

to 25% of the engine compartment. This created the need for developing a narrow-profile axial fan that generates higher static pressure in a limited cooling envelope.

In response to the needs of Multi-Wing’s off-highway diesel engine partners, in 2010 the group from R&D department began its pursuit of gaining maximum static pressure, maximum efficiency, and zero blade deflection as well as securing low noise. By moving beyond conventional fan design, it was able to come up with a three-step

iterative design process using advanced proven as well as new technologies such as optimisation and computational fluid dynamics (CFD).

Group member Toni Stannov, MSc Mech Eng, R&D engineer at Multi-Wing International, explains, “As a first step, we adapted an existing blade design of a low-noise airfoil profile, and then used an advanced optimisation algorithm to construct the new blade. The second step involved computational fluid dynamics pre-qualification of the blade performance. Our advanced technology gives us a very detailed picture of the performance and great data depth.

“In our wind tunnel, we have highly advanced test equipment to verify the results from our CFD calculations,” he adds. “This is the third step in our iterative design process and it enables us to optimise specific sections of the blade.”

PressureMax has a diameter range of 627-1,295cm (24.5-51in) and will be available to the global off-highway engine market in late 2011. **iVT**

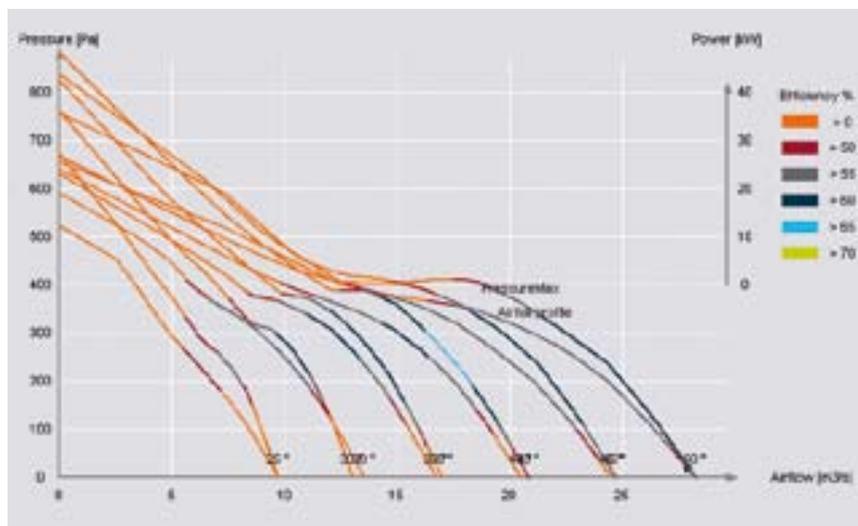


FIGURE 1: Performance curves of PressureMax compared with airfoil profile

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